REMARKS

Claims 2-17 are pending in the application, with claims 2, 4, 6, 8, 10, 12, 14, and 16 being independent. Claims 2, 4, 6, 8-10, 12, 14, and 16 have been amended. Support for the amendments may be found throughout the application, including paragraphs [0077] and [0079] and Fig. 1B of the published application. No new matter has been added.

Applicant's representative thanks Supervisory Patent Examiner Purvis for the courtesies extended during the telephonic interview conducted on January 31, 2007. In the discussion, Applicant's representative discussed the deficiencies of the September 1, 2006 Office Action. A new Office Action (the present Office Action) was said to be forthcoming.

Claim 9 has been amended to correct the typographical error objected to in the Office Action.

Claims 2, 4, 6, 8, 10, 12, 14, and 16 have been rejected as anticipated by U.S. Patent No. 5,488,000 (referred to as "Zhang 1"). Claims 2-17 have been rejected as anticipated by U.S. Patent No. 5,403,772 (referred to as "Zhang 2"). Claims 2-13 have been rejected as anticipated by JP-07074366-A (which is equivalent to U.S. Patent No. 5,481,121 and referred to as "Zhang 3"). Claims 2-13 have also been rejected as anticipated by JP-07297125-A (which is equivalent to U.S. Patent No. 5,696,003 and referred to as "Makita").

Applicant respectfully requests reconsideration and withdrawal of these rejections as neither Zhang 1, Zhang 2, Zhang 3, nor Makita describes or suggests the subject matter of the amended claims.

Zhang 1 Rejection

Zhang 1 is directed to a method for manufacturing thin film transistors using nickel. In Zhang 1, a layer of nickel silicide is used to promote crystallization of an amorphous silicon layer. Specifically, "[A] film 15 containing a trace amount of an element such as nickel silicide is formed on the islands" of amorphous silicon film 13 and its overlying silicon oxide film 14. *See* Zhang 1, Fig. 1 and column 7, lines 39-48. "Nickel silicide is formed on the side surfaces 16 of the amorphous silicon film 13" and "[c]rystals are caused to grow from these side surfaces as indicated by the arrows 17." *See* Id.

In contrast to Zhang 1's use of a nickel silicide layer across the entirety of the island as shown in Fig. 1 as described above, amended claim 2 simultaneously provides first and second regions of a crystallization promoting material comprising a metal such that crystals grow from the first region to the second region and terminate at the second region. The Office Action refers to Zhang 1's disclosure of the arrows 17 as the first region and the central portion 10 as the second region. *See* Office Action, page 5. While the Office Action may be reading Zhang 1 as disclosing crystals as growing in a direction from the arrows 17 to the central portion 10, Zhang 1 does not describe or suggest simultaneously providing the regions noted by the arrows 17 and the central portion 10 with a crystallization promoting material comprising a metal. Rather, Zhang 1 describes providing the nickel silicide layer at side surfaces 16 as crystals are growing "from these side surfaces as indicated by the arrows 17." *See* Zhang 1, Fig. 1 and column 7, lines 39-48.

Consequently, Zhang 1 does not describe or suggest "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region," as recited by amended claim 2. For at least these reasons, the rejection of independent claim 2 should be withdrawn.

Independent claim 4 also recites "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region." Accordingly, the rejection of claim 4 should be withdrawn for the reasons discussed above with respect to claim 2.

Amended independent claims 6 and 8 recite "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second region functions as a stopper for terminating the crystallization from said first region." As discussed above with respect to claim 2, Zhang 1 first forms nickel on the side surfaces 16 and then causes crystals to grow outward

from the arrows 17 to the central portion 10. Consequently, Zhang 1 does not describe or suggest simultaneously providing the regions noted by the arrows 17 and the central portion 10 with a crystallization promoting material comprising a metal, and for similar reasons as above, the rejection of independent claims 6 and 8 should be withdrawn.

Amended independent claims 10 and 12 recite "simultaneously providing said first and second stripe-shaped regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region," and amended independent claims 14 and 16 recite "simultaneously providing said first, second and third stripe-shaped regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film… wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region." As such, the rejection of independent claims 10, 12, 14, and 16 should be withdrawn for the reasons discussed above with respect to claims 6 and 8.

Zhang 2 Rejection

Zhang 2 is directed to a method for manufacturing thin film transistors using nickel. In Zhang 2, two islands of nickel regions 2 are placed on an amorphous silicon film 1. *See* Zhang 2's, Fig. 2(A-1) and 2(A-2) and column 12, lines 22-32. The nickel regions 2 are then annealed, and the nickel enters the amorphous silicon film 1. The nickel advances "from the island nickel regions 2 near the edge to the center as nickel silicide 3A and portions 3 where nickel had passed have become crystal silicon." *See* Zhang 2, column 12, lines 52-54. Finally, "the crystallizations which started from the two island nickel films hit and the nickel silicide 3A remains in the middle." *See* Zhang 2, column 12, lines 55-58.

In contrast to Zhang 2's use of two nickel regions 2 on either side of amorphous silicon film 1 to crystallize to a center location as shown in Fig. 2(A-1) and 2(A-2) and as described above, amended claim 2 simultaneously provides the first and second regions of a crystallization promoting material comprising a metal to grow crystals from the first region to the second region such that the growth of the crystals terminates at the second region. The Office Action refers to

Zhang 2's disclosure of the portions of nickel and silicon 3 as the first region and the nickel silicide edge near the center 3A as the second region. *See* Office Action, page 7. While the Office Action may be reading Zhang 2 as disclosing crystals as growing in a direction from the portions of nickel and silicon 3 to the edge near the center 3A, Zhang 2 does not describe or suggest simultaneously providing the portions 3 and the edge near the center 3A with a crystallization promoting material comprising a metal. Rather, Zhang 2 describes providing the nickel as two islands of nickel regions 2 on a separate area of the amorphous silicon film 1. *See* Zhang 2, Fig. 2(A-1) and 2(A-2).

Further, the Office Action refers to another embodiment illustrated by Figs. 6(a)-6(c) of Zhang 2. In this embodiment, a single portion of nickel 54 is formed on the substrate, and, when annealed, moves outward along a silicon silicide region 55. *See* Zhang 2, column 15, lines 18-32. The Office Action refers to Zhang 2's disclosure of the silicon silicide region 55 as the first region and the silicon silicide regions 59(a) and 59(b) as the second region. *See* Office Action, page 10. Notably, Zhang 2 describes each of regions 55, 59(a), and 59(b) as silicon silicide regions rather than regions with a crystallization promoting material comprising a metal for promoting crystallization. Moreover, this embodiment includes use of a single portion of nickel 54 to promote crystallization through the silicon silicide regions 55, 59(a), and 59(b).

Consequently, Zhang 2 does not describe or suggest "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region," as recited by amended claim 2. For at least these reasons, the rejection of claims 2 and 3 should be withdrawn.

Independent claim 4 also recites "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region." Accordingly, the rejection of claims 4 and 5 should be withdrawn for the reasons discussed above with respect to claim 2.

Amended independent claims 6 and 8 recite "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second region functions as a stopper for terminating the crystallization from said first region." As discussed above with respect to claim 2, Zhang 2 first forms nickel as islands of nickel regions 2 and then anneals the nickel to cause it to diffuse as portions of nickel and silicon 3 to the center as nickel silicide 3A. Consequently, Zhang 2 does not describe or suggest simultaneously providing the portions 3 and the edge near the center 3A with a crystallization promoting material comprising a metal. Moreover, Zhang 2 describes each of regions 55, 59(a), and 59(b) as silicon silicide regions rather than regions with a crystallization promoting material comprising a metal for promoting crystallization. Consequently, for similar reasons as above, the rejection of claims 6-9 should be withdrawn.

Amended independent claims 10 and 12 recite "simultaneously providing said first and second stripe-shaped regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region," and amended independent claims 14 and 16 recite "simultaneously providing said first, second and third stripe-shaped regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film… wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region." As such, the rejection of claims 10-17 should be withdrawn for the reasons discussed above with respect to claims 6-9.

Zhang 3 rejection

Zhang 3 is directed to orienting crystals in circuit sections using nickel. In Zhang 3, a layer of silicon oxide film 504 is selectively etched to form a window region 506 to a silicon film 505 for introducing nickel. *See* Zhang 3, Fig. 5A and column 11, lines 22-24. A nickel salt film is then formed on the top of the silicon oxide film 504 and window region 506. A heat treatment is performed, diffusing nickel into the region under the window region 506/507 and the pixel element section 510. *See* Zhang 3, column 11, lines 50-54. The silicon film 503 crystallizes

vertically and horizontally to a middle area 508 between the window region 506 and the pixel element section 510. *See* Zhang Fig. 5B and column 11, lines 55-67.

In contrast to Zhang 3's use of a nickel salt film 505 over a window region 506 and a pixel element portion 510 to diffuse nickel to a middle area 508 as shown in Fig. 5B and as described above, amended claim 2 simultaneously provides first and second regions of a crystallization promoting material comprising a metal to grow crystals from the first region to the second region such that the growth of the crystals terminates at said second region. The Office Action refers to Zhang 3's disclosure of the portions of the window region 507 as the first region and the pixel element portion 510 as the second region. *See* Office Action, page 12. Zhang 3 does not describe or suggest crystallization growing from the window region 506/507 to and terminating at the pixel element portion 510. Rather, Zhang 3 illustrates the crystallization proceeding from each of the window region 506/507 and the pixel element portion 510 to the middle area 508 there-between.

Consequently, Zhang 3 does not describe or suggest "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region," as recited by amended claim 2. For at least these reasons, the rejection of claims 2 and 3 should be withdrawn.

Independent claim 4 also recites "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region." Accordingly, the rejection of claims 4 and 5 should be withdrawn for the reasons discussed above with respect to claim 2.

Amended independent claims 6 and 8 recite "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second region functions as a stopper for terminating the crystallization from said first region." As discussed above with respect to claim

2, Zhang 3 illustrates the crystallization proceeding from each of the window region 506/507 and the pixel element portion 510 to the middle area 508 between them. Consequently, Zhang 3 does not describe or suggest the pixel element portion 510 functioning as a stopper for terminating the crystallization from the window region 506/507, and, for similar reasons as above, the rejection of claims 6-9 should be withdrawn.

Amended independent claims 10 and 12 recite "simultaneously providing said first and second stripe-shaped regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film...wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region." As such, the rejection of claims 10-13 should be withdrawn for the reasons discussed above with respect to claims 6 and 8.

Makita rejection

Makita is directed to fabricating a semiconductor device using a catalyst introduction region. In Makita, a layer of amorphous silicon film 303 is deposited on a base coat film. *See* Makita, column 18, lines 51-59. Using a mask 304 with an opening, an introduction region 305 is formed over the amorphous silicon film 303. A catalyst is then introduced to the opening to the introduction region 305, and a heat treatment is performed. *See* Makita, column 18, lines 60-67. As a result, crystallization occurs first in the introduction region 305 and later, in outward directions to ending points 307. *See* Makita, Figs. 8B and 8C and column 19, lines 1-13.

In contrast to Makita's use of a single introduction region 305 over the amorphous silicon film 303 to introduce the catalyst as shown in Figs. 8B and 8C and as described above, amended claim 2 simultaneously provides first and second regions of a crystallization promoting material comprising a metal to grow crystals from the first region to the second region such that the growth of the crystals terminates at said second region. The Office Action refers to Makita's disclosure of the introduction region 305 as the first region and the ending points of crystallization 307 as the second region. *See* Office Action, page 14. While the Office Action may be reading Makita as disclosing crystallization as growing in a direction from the introduction region 305 to the ending points of crystallization 307, Makita does not describe or

suggest simultaneously providing the introduction region 305 and the ending points of crystallization 307 with a crystallization promoting material comprising a metal. Rather, Makita describes providing the catalyst in the introduction region 305. *See* Makita, Fig. 8B and column 18, lines 51-59. Moreover, Makita includes use of a single portion for catalyst introduction to promote crystallization through the amorphous silicon film 303.

Consequently, Makita does not describe or suggest "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region," as recited by amended claim 2. For at least these reasons, the rejection of claims 2 and 3 should be withdrawn.

Independent claim 4 also recites "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein crystals grow from said first region to said second region and the growth of the crystals terminates at said second region." Accordingly, the rejection of claims 4 and 5 should be withdrawn for the reasons discussed above with respect to claim 2.

Amended independent claims 6 and 8 recite "simultaneously providing said first and second regions with a crystallization promoting material comprising a metal for promoting crystallization of said semiconductor film…wherein said second region functions as a stopper for terminating the crystallization from said first region." As discussed above with respect to claim 2, Makita first introduces nickel into the introduction region 305 and then uses a heat treatment to cause crystallization to occur in outward directions to ending points 307. Consequently, Makita does not describe or suggest simultaneously providing the introduction region 305 and the ending points of crystallization 307 with a crystallization promoting material comprising a metal, and for similar reasons as above, the rejection of independent claims 6 and 8 should be withdrawn.

Amended independent claims 10 and 12 recite "simultaneously providing said first and second stripe-shaped regions with a crystallization promoting material comprising a metal for

promoting crystallization of said semiconductor film...wherein said second stripe-shaped region functions as a stopper for terminating the crystallization from said first stripe-shaped region." As such, the rejection of claims 10-13 should be withdrawn for the reasons discussed above with respect to claims 6 and 8.

The fee in the amount of $120 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account No. 06-1050.

Respectfully submitted,

Date: 6/14/01

Gabriel Olander
Reg. No. 59,185

Fish & Richardson P.C.
1425 K Street, N.W.
11th Floor
Washington, DC 20005-3500
Telephone: (202) 783-5070
Facsimile: (202) 783-2331

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